

Rynd Farm, Venango county, Pennsylvania: on the 24th an ice gorge, two miles long, formed in Oil Creek, causing the water to rise rapidly and submerge all the low land in the vicinity.

Machias, Washington county, Maine: on the 28th and 29th very heavy rain fell, melting the snow that covered the ground to a depth of twenty inches, and causing an extensive flood.

Portland, Oregon: the total rainfall of this station for the month was 12.31 inches; on the 23d 2.50 inches fell in sixteen hours. From 10 a. m. to 4 p. m. of that date the rainfall was unusually heavy, causing Tanner Creek, a small stream flowing through the western portion of the city, to overflow its banks and carry away wooden sidewalks, fences, and numerous small shanties occupied by Chinese; one person was drowned.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Saint Vincent, Minnesota: at 9.50 p. m. of the 18th an auroral light was observed faintly tinging the northern sky. As the night advanced the display increased in magnitude and brilliancy, illuminating at midnight the whole of the northern sky; at times broad, reddish colored streamers would ascend rapidly toward the zenith. The light was most brilliant at 12.18 a. m. of the 19th, after which it began to fade. The observer at this place states that at 11.20 p. m. of the 24th the indications of an electrical disturbance were manifested by a humming noise made by the telegraph wire running into the office and the imperfect working of the telegraph instruments. Shortly after, an auroral light became visible above the northern horizon; the display increased in magnitude and assumed the form of a bright red arch resting upon a dark base, altitude 15°. The aurora remained in this position until 12.10 a. m. of the 25th, when a second arch began forming under the first; at about 1 a. m. the two arches blended into a diffuse pink light. The display ended at 2 a. m.

Lyons, Wayne county, New York: a diffuse auroral light was visible between 10 p. m. and midnight of the 22d.

Auroral displays were also observed at the following places:

- 7th.—Albany, New York.
- 14th and 15th.—Dudley, Massachusetts; Escanaba, Michigan.
- 16th.—Fort Totten, Dakota; Gardiner, Maine; Wellsborough, Pennsylvania.
- 17th.—Fort Totten, Dakota.
- 18th.—Kent's Hill and Gardiner, Maine.
- 20th.—Wellsborough, Pennsylvania.
- 22d.—Fort Buford and Webster, Dakota; Duluth and Moorhead, Minnesota.
- 23d.—Bismarck, Dakota.
- 24th.—Pekin, Illinois.
- 25th.—Fort Totten and Fort Buford, Dakota.
- 26th and 29th.—Pekin, Illinois.

THUNDER-STORMS.

Thunder-storms are reported to have occurred in the various states and territories during the month, as follows:

- Alabama.—Montgomery, 13th, 23d; Livingston, 13th, 29th; Mobile, 23d.
- Arkansas.—Little Rock and Lead Hill, 22d.
- Florida.—Merritt's Island, 1st, 13th, 14th; Key West, 7th; Limona, 13th; Archer, 13th, 14th, 23d; Duke and Sanford, 14th; Cedar Keys and Pensacola, 23d.
- Georgia.—Quitman, 12th, 14th, 23d; Savannah, 13th; Mill-edgeville, 13th, 23d; Atlanta and Forsyth, 23d.
- Illinois.—Chicago, Collinsville, Manhattan, Pekin, and Peoria, 22d.
- Indiana.—Butler, Laconia, Sunman, and Vevay, 13th.
- Iowa.—Dubuque, Monticello, and Cedar Rapids a, 21st, 22d; Cedar Rapids b, Fort Madison, Independence, and Oskaloosa, 22d.
- Kansas.—Allison, 19th; Independence and Wellington, 22d.
- Kentucky.—Louisville, 13th.
- Louisiana.—Grand Coteau, 22d, 23d, 28th, 29th; Shreveport, 22d, 28th; New Orleans, 23d.

Massachusetts.—Blue Hill Observatory, Cambridge, and Milton, 24th; Fall River, 26th.

Michigan.—Kalamazoo and Mottville, 22d.

Minnesota.—Saint Vincent, 10th.

Mississippi.—Vicksburg, 22d, 23d, 28th.

Missouri.—Centreville, Central College, and Conception, 22d.

North Carolina.—Kitty Hawk and Hatteras, 13th; Smithville and West Point, 14th; Flat Rock, 23d.

Ohio.—College Hill, Jacksonborough, West Milton, and Yellow Springs, 13th.

Oregon.—Mount Angel, 15th.

South Carolina.—Charleston, 13th, 29th; Spartanburg, 23d.

Tennessee.—Austin and Chattanooga, 13th; Milan, 13th, 22d, 28th; Nashville, 13th, 23d; Knoxville, 23d, 24th; Ashwood, 13th, 28th.

Texas.—Cleburne, Dallas, and New Ulm, 22d.

Wisconsin.—Delavan, Fond du Lac, Madison, and Manitowoc, 21st.

ELECTROMETER READINGS.

Observations of the electrical potential of the atmosphere have been continued during the month of January, 1887, as usual. At Washington City, in a series of simultaneous observations at the top of the Washington Monument and at the Signal Office on January 28th, the following values were obtained:

Time.	Monument.	Signal Office.	Difference.	Time.	Monument.	Signal Office.	Difference.	Remarks.
	Volts.	Volts.	Volts.		Volts.	Volts.	Volts.	
1 p. m.	375	162	213	2 p. m.	450	150	300	Wind, waw.; sky about nine-tenths covered with cirro-stratus clouds. At the Monument, wind blowing strongly on the collector. A very feeble spark could be obtained after 2 p. m. on "grounding" the needle.
1.05 p. m.	225	144	81	2.05 p. m.	500	138	362	
1.10 p. m.	300	132	168	2.10 p. m.	500	144	456	
1.15 p. m.	300	126	174	2.15 p. m.	500	126	374	
1.20 p. m.	350	126	224	2.20 p. m.	375	132	243	
1.25 p. m.	300	132	168	2.25 p. m.	325	96	229	
1.30 p. m.	425	138	287	2.30 p. m.	450	96	354	
1.35 p. m.	250	132	118	2.35 p. m.	500	102	398	
1.40 p. m.	375	138	237	2.40 p. m.	500	120	380	
1.45 p. m.	425	132	293	2.45 p. m.	500	152	348	
1.50 p. m.	375	156	219	2.50 p. m.	500	180	320	
1.55 p. m.	375	156	219	2.55 p. m.	500	186	314	
				3 p. m.	500	192	308	

In the regular series of observations, negative values were obtained at 9 and 11 a. m. on the 10th, during clear weather with brisk northwesterly winds, and do not appear to be reconcilable with any noted change in the weather; on the 17th, preceding and during rain; on the 24th, during rain and during the commencement of snow; on the 26th, small values, during light rain; and on the 29th, during rain. Snow was generally accompanied by positive values.

At Baltimore, Maryland, a continuous photographic record has been obtained, and the following notes are abstracted from the observer's report: "There have been, during the month, four electrical storms. The first began with a rapidly increasing positive potential at 7 p. m. on December 31st, which became normal at 9 a. m. of January 1st. Fluctuations, rapidly alternating in sign, and in magnitude far beyond 1,000 volts, occurred until 12.30 a. m., followed by smaller oscillations until 3.30 a. m., from which time until 6.30 a. m. the curve is normal. A sudden fall to a negative value of 900 volts then occurs, and the potential remains negative until 9 a. m. Snow began at 1.30 p. m. on December 30th, changing to rain, which ended at 9.15 a. m. January 1st. The second disturbance began, with a sharply falling potential, at 7 p. m. on January 13th, and ended at 5.30 a. m. of the 14th. The most violent fluctuations occurred from midnight until 1.30 a. m. Rain began at 6.55 p. m. on the 13th and ended on the a. m. of the 14th. The third period of disturbance was preceded by a slowly falling potential from noon of the 16th until noon of the 17th, when occurred a sudden drop to a negative value of 800 volts, followed by slow fluctuations until 5 p. m., when the curve became normal. Rain began at 10.55 a. m. and ended at 4.10 p. m. of the 17th instant. The fourth, a storm of great violence,

continued from 3 a. m. to 3 p. m. of the 24th. At the former time the potential suddenly rose to a very high value, and remained beyond the scale limit until 5 a. m., when it rapidly fell to 700 volts negative. Oscillations from positive to negative continue until 1.20 p. m., when the potential becomes positive, reaching an observed value of 2,500 volts, becoming normal at 3 p. m. Rain began on the morning of the 24th, turning to snow at 11.45 a. m. and ending at 2.50 p. m."

At New Haven, Connecticut, negative values were obtained on December 31st, during sleet; on January 1st, during rain; on the 14th, during rain; on the 17th, during rain; on the 24th, during rain; on the 29th, during rain. Snow was accompanied by characteristic positive values on the 4th, 5th, 15th, and 26th.

At Boston, Massachusetts, negative values were recorded on January 4th, in advance of, and during, snow; at 1 p. m. on the 5th, six hours in advance of rain; on January 9th, preceding, and during, snow; on January 24th, during rain, preceding thunder by two hours; on the 26th, at 9 and 11 a. m., preceding snow, beginning at 11.15 a. m. Thus on all these dates the electrometer indications might have been successfully used in the prediction of coming weather changes. Rain occurred on December 31st and January 1st, ending at 2.10 p. m. of the latter date, accompanied with low positive values. High positive values prevailed during the clear weather following. Rain on the 6th from 11 a. m. until 1 p. m., preceded by snow, was accompanied by low positive values. Snow and rain on the 14th and 17th were accompanied by low positive values. On the 24th rain began at 7 a. m., ending at 8.45 a. m., beginning again at 9.05 and continuing throughout the day. Two loud peals of thunder were heard at 1.30 p. m. The values noted for the four observations were, respectively, 14.0, -31.6, 20.2, and 30.8 volts. On the 28th light drizzling rain began at 12.30 p. m. and continued until 2.15 p. m. A negative value was observed at 10 a. m., or two and a half hours in advance of the commencement of the rain. Snow, as was said above, in several cases was preceded, sufficiently long to be of value in prediction of the weather, by negative values, and in all cases by a fall in the value of the potential. At Columbus, Ohio, negative values were recorded only on the 14th, with threatening weather and rain, and on the 28th, during fine rain. Snow at this station was generally accompanied by positive values.

At Ithaca, New York, snow on January 1st, 5th, and 7th, was accompanied by positive values. On January 10th light snow began at 8.45 a. m., ending at 10 a. m. The values at the 9 and 11 a. m. observations being, respectively, negative 130 volts, and positive 40 volts. On January 13th negative values precede the snow by five hours; on the 15th, during the continuance of snow all that day and the next, the values remain negative, when, as a rule, during continued snow, values which are at first negative change to positive, often of very high value. On the 17th negative indications precede rain four hours. Snow on the 18th is accompanied by high positive values. On the 19th and 20th, during cloudy weather, negative values are recorded, from which snow might have been anticipated on either date. Snow on the 21st was accompanied by negative, and preceded by low positive values. On the 24th negative values were obtained during snow; on the 26th, low, changing to high positive values, were recorded during snow; and on the 28th negative values were obtained during threatening weather.

Chart vi shows the observations made at the different stations during the month of January.

There would seem to be at all four stations some slight agreement as to the dates of negative values, particularly on January 24th.

As the observations at present embrace but a part of the days, and are made at different elevations, and under differing conditions, it is hardly worth while to do more, in the discussion of these results at present, than to call attention to some of the most general correspondences.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories on the following dates:

Arizona.—4th, 19th, 20th, 26th, 27th.
California.—1st, 2d, 4th, 19th, 27th.
Colorado.—7th.
Connecticut.—7th, 8th, 13th, 19th.
Dakota.—1st, 5th, 6th, 7th, 9th, 16th, 31st.
District of Columbia.—7th, 9th, 10th.
Florida.—14th, 28th.
Georgia.—4th, 19th, 28th.
Idaho.—9th.
Illinois.—1st to 3d, 5th to 11th, 13th, 16th, 18th, 21st, 24th, 27th to 30th.
Indiana.—6th, 11th, 12th, 22d, 24th.
Iowa.—1st, 2d, 3d, 5th, 6th, 7th, 10th, 12th, 17th, 18th, 25th, 30th.
Kansas.—6th, 18th, 19th, 21st, 25th, 26th, 27th, 29th, 30th, 31st.
Maine.—9th, 12th, 13th, 19th, 31st.
Maryland.—7th, 9th, 10th, 13th, 19th, 20th.
Massachusetts.—7th to 10th, 13th, 17th, 19th, 23d, 25th, 31st.
Michigan.—6th, 11th, 13th, 20th, 27th, 29th, 30th.
Minnesota.—4th, 10th, 17th, 20th, 21st, 22d, 25th, 30th.
Missouri.—1st.
Montana.—10th, 14th, 17th.
Nebraska.—1st, 3d, 6th, 31st.
Nevada.—2d.
New Hampshire.—8th, 13th, 19th, 25th, 28th, 31st.
New Jersey.—7th, 8th, 19th, 28th.
New York.—4th, 5th, 7th, 8th, 13th, 20th, 25th, 27th, 30th.
North Carolina.—3d.
Ohio.—4th, 6th, 7th, 8th, 11th, 16th, 21st, 26th.
Oregon.—16th.
Pennsylvania.—4th, 7th, 8th, 14th, 25th, 31st.
South Carolina.—2d, 4th, 6th, 13th, 19th, 28th.
Tennessee.—2d, 3d, 4th, 6th, 7th, 14th, 16th, 19th, 21st, 23d, 27th, 30th.
Vermont.—13th.
Virginia.—4th, 7th, 9th, 10th, 31st.
Wisconsin.—1st, 3d, 5th, 6th, 7th, 9th, 10th, 14th, 17th, 18th, 21st, 25th, 27th, 29th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories during the month, as follows:

Arizona.—1st to 5th, 12th, 30th.
Arkansas.—5th, 6th, 30th.
California.—1st to 6th, 11th, 29th.
Colorado.—2d to 5th, 7th, 8th, 15th.
Connecticut.—6th, 7th, 8th, 11th, 31st.
Dakota.—1st, 3d to 8th, 10th, 11th, 15th, 16th, 29th, 30th, 31st.
Delaware.—11th.
District of Columbia.—7th.
Florida.—6th, 10th, 31st.
Georgia.—4th, 6th, 30th.
Illinois.—1st, 3d, 4th, 5th, 7th to 12th, 29th, 30th.
Indiana.—3d, 5th, 7th, 10th, 11th, 27th, 29th, 30th.
Iowa.—3d, 5th, 11th, 16th, 17th, 29th, 31st.
Kansas.—1st, 3d, 5th, 6th, 7th, 10th, 14th, 18th, 19th, 21st, 29th, 30th, 31st.
Kentucky.—3d.
Louisiana.—1st, 3d, 8th, 29th.
Maine.—7th, 8th, 31st.
Maryland.—4th, 6th, 7th.
Massachusetts.—4th, 6th, 7th, 8th, 11th.
Michigan.—2d, 3d, 4th, 7th to 10th, 13th, 18th, 19th, 29th.
Minnesota.—2d, 3d, 5th, 8th, 10th, 11th, 20th, 31st.
Missouri.—5th, 7th, 12th, 30th, 31st.
Montana.—3d, 5th, 9th, 10th.